POPULATION DYNAMICS OF OLIGOCHAETA OF A BEECH FOREST IN THE NORTHERN BLACK FOREST (FRG)

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ДИНАМИКА НАСЕЛЕНИЯ ОЛИГОХЕТ БУКОВОГО ЛЕСА В СЕВЕРНОЙ ЧАСТИ БЛЭК ФОРЕСТ (ФРГ)

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Introduction

In many soils of the Central Europe Oligochaetes represent a large proportion of the biomass of the overall soil fauna. The distribution of animals depends on the type of soil, soil moisture, pH and vegetation.

Greatly different amounts of Oligochaeta can be found in beech forest, the predominant form of vegetation under natural conditions in the Middle Europe. Therewith, Lumbricids and Enchytraeids respond differently to ecological conditions:

	Number of individuals per m^2	
	Mull soils	Moder soils
Earthworms	155	25
Enchytraeids	15.000	76.000

In both families, the number of species is reduced in acid soils.

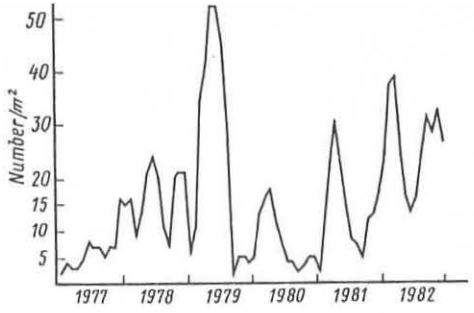
The investigations presented in this poster are part of a research programme "The biology of a beech forest soil". The aim of the project is to elucidate the function of soil invertebrates in the decomposition of forest litter. The programme is conducted cooperatively by the Battelle-Institute and the Museum of Natural History (Karlsruhe). The site of investigation, homogenous beech forest (approximately 100 years old, pH 4.5) is located in the north of the Black Forest near the city of Karlsruhe.

Site and Methods

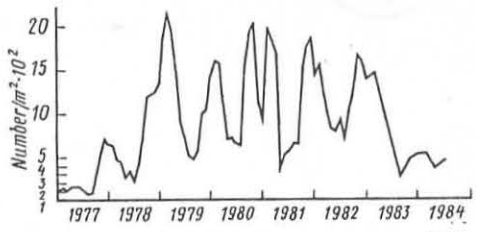
The investigation site (Stadtwald Ettlingen, Northern Black Forest, FRG) is described by Dr. Dumpert's poster "Influence of a two years' treatment by PCP and 2,4,5-T on spider populations of a beech forest".

The earthworms were collected by hand-sorting every month from 1977 until 1984. Other methods, e.g. formalin-extraction were not used since no mineral-soil dwelling species live at this site. The test of the collecting effectivity yielded a satisfactory result of 91% of the individuals.

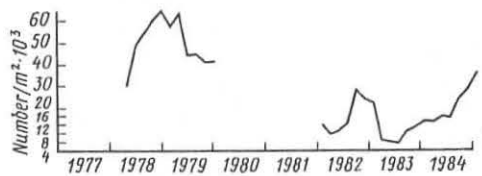
Enchytraeids of the three layers of the organic deposit (L,F,H) were sampled every month from 1978 to 1979 and from 1982 to 1984. Every sample had a size of one ninth of a square meter. At first the substrate was hand-sorted to detect the larger animals (QH), then 20 g from each sample were suspended in 4% Formalin (QA). After the fixation small parts of the liquid were investigated successively by using a binocular. The specimen were incubated in Polyvinyllactophenol and preserved on slides.



F i g. 1. Lumbricidae abundance



F i g. 2. Enchytraeidae abundance (QH)



F i g. 3. Enchytraeidae abundance (QA)
1977, 1980, 1981 - not determined

Lumbricidae: Results

During the period of one year, the number of earthworms increased from late winter to early summer (Fig.1).

The ratio of the abundance of L.rubellus to D.rubida (both subspecies together) was approximately 2:1, of biomass 4:1.

The seasonal pattern of L.rubellus and D.rubida were comparable, though the latter one showed more irregularities. Probably this true epigeic species is more affected by climatic influences.

On average, 16 animals per m^2 with 256 mg dry substance per m^2 were collected monthly.

The association of L.rubellus, D.rubida and B.eisensi seems to be prevailing for acid soils of deciduous forests in the Middle Europe.

Enchytraeidae: Results

Hand-Sorting (QH, Fig.2). By this method only large animals of the species M.glandulosus and C.sphagnetorum were detectable. More than 25.000 specimens were collected. On average, the density was 936 animals per m^2. While C.sphagnetorum can fragmentate all year, M.glandulosus has a very distinct cycle of reproduction with juveniles in autumn and adults in late winter. Therefore, this species is responsible for the distinct seasonal pattern from 1978 to 1982. In 1977, the abundance was relatively low. This can be explained by the extraordinary density of Diptera larvae in 1977, who compete with the Enchytraeids. In 1983, the maximum of abundance failed to take place since the summer was extremely dry.

Suspension Method (QA, Fig.3). Unfortunately, there are no samples for the years 1980 and 1981. On average, in 1978/79 the number of individuals is twice as much as in 1982-84. This difference may have occurred as a result of climatic changes. After a wet summer season in 1984, the number of individuals began to increase again.

The dominant species were C.sphagnetorum in the F-layer and M.clavata in the H-layer. The number of individuals in the L-layer was neglectable, particularly in summer, where often no Enchytraeids were found in the upper layer. 40% of the animals live in the F-layer and 60% in the H-layer. The number of individuals per m^2 fluctuated between 3000 (summer 1983) and 64.000 (winter 1978). The average was 28.000 per m^2.

List of Species: ++++ - very frequent; +++ - frequent; ++ - seldom; + - sporadic.

1. L u m b r i c i d a e. Lumbricus rubellus (+++); Dendrobaena rubida rubida (++); Dendrobaena rubida subrubicunda (++); Bimastos eiseni (+).

2. E n c h y t r a e i d a e. Cognettia sphagnetorum (++++); Marionina clavata (++++); Marionina cambrensis (++++); Mesenchytraeus glandulosus(+++); Cognettia cognettii (+++); Stercutus niveus (++); Achaeta sp. (2 species) (+++); Mesenchytraeus pelicensis (++); Bryodrilus ehlersi (++); Enchytraeus buchholzi (+); Enchytronia parva (+).

3. T u b i f i c i d a e. Rhyacodrilus falciformis (+).

4. A e o l o s o m a t i d a e. Aeolosoma sp. (+).

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